

Willard Says.....

Do not deprive yourself of this really useful stuff about dredge pipelines

Discharge Pipeline—Inside Diameter

A Tale of Woe

Harvey bought a nice new 8-inch dredge to mine sand and gravel in his pit near the river. He got the right advice and bought 600 feet of 10-inch, SDR 13.5 plastic (HDPE) pipe for the dredge. That pipe served well for several years and the rate of production was very good. All was well when an opportunity arose to put his dredge to work on a nearby highway fill project. He bid and got the job which essentially involved mining the same material that he was pumping into his process plant. The main difference was that the pumping distance varied from 400 feet at the near end to 4,700 feet at the far end. He was advised that he would need to add a booster at some point and his bid reflected that cost.

Harvey commenced pumping on the close-in section of the project using the 10-inch pipe from his sand operation and production was great. Success was his.

Anticipating the need Harvey bought 4,500 feet of new HDPE pipe: enough to complete the fill job. He noted that production was falling off soon after they began adding the new pipe to reach the fill area. Nothing they did restored production to the rate they had enjoyed initially and indeed, it continued to decrease as the new pipe was added.

The booster was ready so they installed it in the line and production came back up to a satisfactory level although it did seem like they were burning a lot of fuel.

Pipe was added every few days, production continued to fall and soon dredge and booster were running fill tilt. The real problem was that they were only about half way to the end of the project.

About this time I got a chance to look in on this project and noted that the new pipe was SDR 13.5, same as the original pipe, however, it was EIGHT-inch, not TEN-inch. The original 10-inch SDR13.5 had an inside diameter of 9.2 inches. The new 8-inch SDR13.5 had an inside diameter of 7.3 inches. Going from the 10-inch pipe to the 8-inch amounted to a 35 percent reduction in cross-sectional area. Kind of like trying to cram 12-lb of stuff into an 8-lb sack!

The practical result of this drastic reduction in the inside diameter of the discharge pipe was a tremendous increase in power required to overcome the increase in friction caused by the use of the smaller diameter pipe. Neither dredge nor booster had near enough power to do that and production suffered.

I judged Harvey to be a penny-pinching hard head and he certainly exhibited those traits regarding this situation. He had bought the 8-inch pipe for the job and by Jove he was going to use it. He rented another booster and finished the job. Then he took the 8-inch pipe back to his sandpit determined to wear it out and get his money's worth out of it. I was unsuccessful in trying to prove to him that the small pipe was costing him thousands of dollars each year in increased production cost. His people coped with the small pipe for several years until they finally got a new string of 10-inch SDR13.5.

I don't know whether he made any money on the fill job. I suspect that it was a learning experience.

The moral of this story? Buy HDPE pipe for its ***inside diameter***, not its OD.

How to Specify HDPE Pipe

Buying HDPE pipe is not especially difficult once you remember that it is available in the same outside diameters as steel pipe but with a wider selection of wall thicknesses. HDPE pipe is identified by a number that designates its outside diameter followed by the letters "SDR" and then another number. This designation is printed every few feet along the outside of the pipe.

The SDR (Standard Dimension Ratio) number specifies the wall thickness of HDPE pipe, which can be determined by dividing the diameter by the SDR number. For example, 8 HDPE SDR13.5 pipe has the same outside diameter as 8-inch steel pipe—8.625 inches and the wall thickness is the diameter 8.625" divided by the SDR number 13.5. In this case the wall thickness is $8.625"/13.5 = 0.639$ inches. The outside diameter minus twice the wall thickness gives an inside diameter of 7.35 inches. If you buy 8-inch HDPE pipe to replace 8-inch steel pipe—a very common error—you end up with a pipeline that is about 19 percent smaller in cross-sectional area and that will be a problem—a big step in the wrong direction.

There are good reasons for using plastic pipe as long as it wears well enough to be economically feasible considering all the benefits it offers.

Table 1, page 2 of **WillardSays...Pipeline...How Far Can a Pump Pump?** lists steel and plastic pipes in order of increasing inside diameter. Use this table to guide your choice of HDPE pipe. Keep in mind that it usually does not work very well to try to pump sand and gravel through a pipeline that has an inside cross-sectional area that is 20 percent or more greater than that of the dredge pump discharge nozzle. The table does not show all available HDPE pipes so another inside diameter may better suit your situation.

Be certain to buy HDPE pipe with an ample pressure rating. The pressure rating (resistance to rupture) relates to wall thickness. Keep in mind that the resistance to rupture will diminish as wear reduces the wall thickness.

Contact willard@willardsays.com with questions, comment or criticism.